Speeding ahead on the telecom and digital economy highway

Key priorities for realizing a “Digital Bharat”
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Summary of recommendations
Glossary
The Federation of Indian Chambers of Commerce and Industry (FICCI), in association with knowledge partners EY, is proud to present the report - Speeding ahead on the telecom and digital economy highway. The report aims to identify opportunities and lay down the impediments affecting the growth of the telecom sector, with a view to aid policy makers in ironing out these challenges.

Over the last decade, the growth of the entire telecom ecosystem has significantly propelled the growth of digital quotient in the country, and, in turn, positively affected the lives of a vast majority of India's population. With more than 960 million subscribers, telecom services have reached some of the remotest areas in the country acting as an enabler for the masses.

The digital revolution now stands at the cusp of a transformation, with the new government laying out its vision of a digitally enabled India. The multi-faceted “Digital India” program aims to transform the country into a knowledge economy using technology for delivery of various government services and initiatives. The success of this program is likely to ride on the back of strong telecom ecosystem and its allied industries in the value-chain.

However, impeding issues on the policy and regulatory front, have the potential to decelerate the growth of the entire digital value chain. With a view to enable the next stage of digital revolution, this report outlines a roadmap for the resurgence of the telecom sector and lays out some pertinent, specific, and actionable recommendations. It highlights the role of each contributor in the ecosystem and the challenges faced by them. We hope this report will help in advancing government and industry cooperation to drive the next wave of telecommunications and internet growth.

We thank the contributors from FICCI Communications and Digital Economy Committee and participants from the industry for their valuable contributions and for sharing their perspectives.

Dr. A Didar Singh
Secretary General
FICCI

Mr. Virat Bhatia
Chairman
Communications & Digital Economy Committee
FICCI

Mr. Rajat Mukarji
Co-Chairman
Communications & Digital Economy Committee
FICCI
EY, in association with the Federation of Indian Chambers of Commerce and Industry (FICCI), is pleased to present the report - Speeding ahead on the telecom and digital economy highway. The report delves into the challenges faced by India's telecom industry and its associated sectors set against the backdrop of the Government’s push to propel India toward a digitally empowered future. The report aims to highlight key focus areas to give an impetus to the industry, and makes actionable recommendations to realize the dream of a “Digital India”.

The rising digital quotient of the country has transformed the way we live and communicate, and further advancement in the telecom industry is expected to drive the next phase of economic growth in India. The role of telecom and allied services in the country has expanded significantly from it being a provider of vanilla connectivity to becoming an instrument of socio-economic transformation. The resultant benefits transcend sectors.

In the past year Government has initiated measures to advance communication infrastructure, enhance connectivity and drive the adoption of internet. The launch of “Digital India” program – an ambitious and robust blue-print for transforming the digital identity of the country – and the thrust on smart cites are expected to be game changers. Likewise, Government’s flagship “Make in India” initiative to boost the manufacturing ecosystem in the country is expected to aid the telecom and IT equipment-manufacturing in the country.

However, challenges continue to exist. Prevailing uncertainties in the regulatory landscape, delays in resolution of pertinent issues, non-availability of adequate spectrum for the launch of next-gen services, and the structural imbalances in taxes and levies imposed have the potential to dampen the growth momentum of the sector. Furthermore, the advent of new service delivery models, and their impact on the industry and the ecosystem need deliberation.

Looking ahead, timely resolution of issues, as well as continuous investment in communication infrastructure and its upgrade is vital for promotion of sustainable and inclusive growth in the country. A favorable and stable regulatory environment, coupled with increased transparency, is critical for attracting investments to the sector. An empathetic perspective of challenges faced by service providers is also important for restoring its vitality.

This report highlights some of the key impediments faced by the industry and elaborates on the evolution of policies required to address these issues. It aims to capture inputs from a wide range of stakeholders encompassing telecom service providers, infrastructure providers, social media and internet players, handset manufacturers, and industry associations and practitioners.

I take this opportunity to express my gratitude to industry members who debated the issues and helped us formulate actionable recommendations. I would also like to thank FICCI Communications & Digital Economy Committee for its involvement and support, especially for facilitating interactions with its members, which helped us significantly in gathering valuable insights and framing a point of view.

I hope you find this report interesting and informative.

Prashant Singhal
Global Telecommunications Leader
EY
About the report

EY, in collaboration with FICCI, has developed this report on the key priorities for realizing a digital revolution in India. The report attempts to highlight the key challenges faced by the telecom and allied sectors, and calls for deliberation by the Government on resolution of these issues. Currently, the sector is at a juncture where it requires a regulatory impetus to migrate to the next phase of growth. This report aims to provide an objective set of recommendations to the Government to steer the sector onto the next phase of growth.

- Chapter 1 highlights the ambitious vision of Digital India and how the Government seeks to leverage ICT to create a knowledge-based economy. It brings forth the role of ICT to enable inclusive growth and gives a detail of the framework planned by the Government to bring digital revolution in the country.

- Chapter 2 delves into challenges faced by telecom operators in today’s rapidly changing market landscape. It assesses how issues relating to high regulatory pay-outs, allocation of critical resources such as spectrum and policy-related uncertainties need to be addressed to encourage growth in the sector.

- Chapter 3 talks about the telecom infrastructure segment, which plays a key role in supporting the growing demand for telecom. It looks at challenges of multiple clearances and delays in extension of benefits from policy reforms, as deterrents for timely roll out of networks.

- Chapter 4 reviews the current state of the handset industry. It provides a snapshot of challenges faced by the segment, highlights the need for revision of some schemes and benefits, and deliberates the need to boost the manufacturing ecosystem.

- Chapter 5 focuses on the growing importance and benefits of the internet as a global medium of communication. It highlights how concerns relating to internet governance and cyber security need an all-inclusive approach to arrive at a facilitating framework. It also discusses aspects such as security, testing and standards in the telecom equipment domain.

- Chapter 6 looks at emerging services such as cloud and M2M in the context of how formation of appropriate policies is essential for their uptake.

Methodology

While preparing this report, EY collaborated with the FICCI Communications and Digital Economy Committee and conducted comprehensive meetings and interviews with senior executives of India’s Information and Communications Technology (ICT) sector. The interviews provided a first-hand perspective of challenges faced by various stakeholders in the sector. The findings have been combined with extensive secondary research, analysis and insights provided by EY. The recommendations have emerged from input provided by senior executives across the entire telecom and digital economy value chain. They specifically focus on issues that require the urgent attention of policy-makers and suggest measures sought from the new Government.

The report also discusses examples and case studies from India and across the world to supplement the recommendations in context of various challenges. It highlights the many ways in which the Government, policy-makers and implementing agencies can consider the success stories for adaptation in the Indian context.

Acknowledgement

EY report development team:
Gaurav Kapoor, Gunpreet Singh, Kanika Kakar, Mayur Sachdeva, Pragya Joshi, Runa Dasgupta, Swapnil Srivastava, Swati Mahajan, Yukti Mittal
Industry associations

**Federation of Indian Chambers of Commerce and Industry (FICCI):** Established in 1927, FICCI is the oldest and largest apex business organization in India. Its history is closely interwoven with the country's struggle for independence and its subsequent emergence as one of the most rapidly growing economies in the world. FICCI plays a leading role in policy debates that are at the forefront of social, economic and political change. Its stand on policy issues is sought by think tanks, governments and academia and its publications are widely read for their in-depth research and policy prescriptions. FICCI's direct members are from the private and public sectors, including from SMEs and MNCs, and it has an indirect membership of more than 250,000 companies from regional chambers of commerce.

**Cellular Operators Association of India (COAI):** Established in 1995, COAI is a registered, non-profit, non-governmental society dedicated to advancement of modern communication through the establishment of a world-class cellular infrastructure. Over the years, COAI has emerged as the official voice of the Indian GSM Industry and interacts directly with ministries, policy-makers, regulators, financial institutions and technical bodies. It provides a forum for discussion and exchange of ideas between these bodies and service providers, who share a common interest in development of cellular mobile telephony.

**Association of Unified Telecom Service Providers of India (AUSPI):** Constituted in 1997, AUSPI is a registered society that works as a non-profit organization with the aim of delivering improved access to, coverage of and teledensity in India. It is the representative industry body of unified access service licensees providing CDMA and GSM mobile, fixed line and value-added services across the country.

**Towers and Infrastructure Providers Association (TAIPA):** TAIPA is the body of infrastructure providers who service telecom operators. It plays an active role in deliberations with ministries, policy-makers, regulators, financial institutions and technical bodies for promotion and growth of telecom infrastructure and telecom services.

**Indian Cellular Association (ICA):** ICA is the apex body of the mobile industry and includes brand-owners, technology providers, manufacturers, national distributors, applications, and solution and VAS providers. It was constituted to provide value and services to India's mobile cellular handset industry by fuelling its growth and improving its competitiveness by helping to create a legal and ethical market, and regulatory environment. This is expected to result in the benefits of mobile connectivity being extended to the masses.

**Telecom Equipment Manufacturers Association (TEMA):** Established in 1990, TEMA is an industry association of telecom equipment manufacturers as well as manufacturers of components and cables. It plays an active role in dissemination and exchange of information amongst government and foreign agencies, embassies, trade missions, Indian missions abroad, and leading national and international trade associations.

**Association of Competitive Telecom Operators (ACTO):** Established in 2008, ACTO is an industry body, which focuses on policies that enhance enterprise telecommunications in India. The association was formed by several leading non-integrated long distance carriers that provide services to the enterprise market segment, which includes the IT-enabled services, business process outsourcing and multinational company segments.
Speeding ahead on the telecom and digital economy highway
Prominent contributors

Virat Bhatia
Chairman
Communications & Digital Economy Committee
FICCI

Rajat Mukarji
Co-Chairman
Communications & Digital Economy Committee
FICCI

Ankhi Das
Head, Public Policy for Facebook, India and Chair of FICCI subcommittee on Broadband Access

Sandeep Bhargava
Director India - Corporate Affairs, Nokia and Co-chair of FICCI subcommittee on Handset, Equipment & Solutions

Ashok Sud
Secretary General, Association of Unified Service Providers of India and Co-Chair of FICCI subcommittee on Strategy, Policy and Spectrum

T R Dua
Executive Director, Towers and Infrastructure Providers Association and Chair of FICCI subcommittee on Towers and Infrastructure

Vivek Vasishtha
Country Leader, Government Programs, IBM and Co-chair of FICCI subcommittee on Handset, Equipment & Solutions

Vikram Tiwathia
Associate Director General, Cellular Operators Association of India and Chair of FICCI subcommittee on Internet Governance, M2M and Emerging Issues

We are grateful for the contribution of the above listed members as well as a broad array of industry experts whose insights and perspectives were highly valuable in drafting the report.
Spotlight on India’s Digital Highway

The draft IoT policy by DeitY aims to create a US$15 billion IoT industry by 2020

Wireless access accounts for 92.6% of India’s internet subscribers

DeitY has formed a joint task force with an aim to produce 500 million handsets by 2019

Total operator outlay in March 2015 spectrum auction: INR1,099 billion

Make in India

e-governance

BharatNet

Digital India

Internet governance

Cyber security

Internet of things

Fiber roll-out

Spectrum roadmap

Wi-Fi and LTE

Digital inclusiveness
83% of India’s current demand for handsets met via imports

In FY14, India telecoms debt stood at INR2,500 billion, higher than industry gross revenue of INR2,339 billion

The sale of mobile handsets to cross 300 million by the end of 2015

Government intends to build 100 smart cities in India, with investment of INR480 billion over the next five years

India ranks 125th in the world in terms of fixed broadband penetration

18MHz, the average operator spectrum holding in India is amongst the lowest globally

INR1,130 billion, the approximate outlay for Digital India programme

The Twelfth Five Year Plan projects investments of around INR94 billion in the telecom sector

Export of mobile handset from India expected to fall to zero in 2015

Job creation by Digital India: 17 million direct and at least 85 million indirect

USOF contains INR356 billion in unutilized accumulated funds

150,000 additional towers required to provide pervasive mobile connectivity and bridge availability gaps
After the landmark elections of 2014, the incoming Government had brought with it expectations of a new development trajectory. Following that path, the country is treading toward a blend of favorable macroeconomic fundamentals along with strong demographics. With a new regime at the center, the macroeconomic environment is expected to improve further as government policies and agendas come up to speed.

As the country embarks on this new chapter of growth, the telecom sector is also moving toward a phase of evolution and development. Operators are transforming their networks into absorbent digital platforms with the confluence of internet, IT, social media, and mobile computing and cloud services. The telecom industry is heading toward agile business models, fast-paced and disruptive innovation, and a dynamically changing industry landscape.

There has been a renewed and focused direction to the Indian telecom sector in the last twelve months. The country has embarked on one of the world’s most ambitious broadband project with the “Digital India” program, which seeks to transform India into a digitally empowered society and knowledge economy. The vision is to provide digital access to all by expanding rural internet coverage to 250,000 villages and leveraging this ICT infrastructure as a foundation to deliver e-governance services on demand.

Another significant initiative is the 100 smart cities project, which aims to improve quality of life by leveraging technology. This gargantuan project has drawn considerable interest from all stakeholders as well as foreign collaborations for funding and technical expertise.

With these initiatives, the Government aims to harvest the power of internet and drive in socio-economic development of the country. These seek to capitalize on ICT to drive financial inclusion and facilitate growth in some critical sectors including infrastructure, health care and education.

Currently, creation of an investor friendly environment is one of the principal requirements for progress of the ICT sector. Retrospective aspects of policy changes and high regulatory payouts need to be reviewed to gain investor confidence. Rationalization of taxes and levies and provision of adequate financial aids and incentives are also essential to stimulate development in the sector. Moreover, a clear road-map of spectrum availability with a rational pricing structure needs to be developed and additional spectrum should be made available to support the growth of mobile broadband.

The infrastructure segment, which feeds as a backbone to the telecom industry, is another area of significance to foster development of the ICT sector. In this regard, inclusion of telecom towers in the harmonized infrastructure list and measures to ensure timely right of way (RoW) have been steps in a positive direction. However, it is imperative that the benefits of these decisions trickle down to the industry at implementation levels.

Another ambit of the ICT sector is the handset segment. In this segment also, India has long sought to provide an impetus to the sector through the release of National Policy on Electronics 2012 and launch of various schemes. There is a need to strengthen the handset manufacturing ecosystem in India via incentives, and rationalization of taxes and levies.

The proliferation of the internet and social media has thrown up new challenges in the areas of security, privacy and governance. The dynamic nature of these media demands a strategic shift in formulation of regulations that are mindful of the global context of such media, and also protect the interests of industry and consumers.

In addition to legacy services, technologies such as cloud and machine-to-machine, are bringing a plethora of new opportunities in the ICT space in the country. Uptake of these services is expected to rise with advances in technologies, particularly with increasing availability of high-speed internet connectivity. Given the nascent stage of these domains, it is important to put in place clear regulatory frameworks to set up a solid foundation for these services to prosper.

Looking ahead, a collaborative effort and focus on affordability are musts to run the digital kranti campaign. In a country with low per capita income, it is essential to focus on increasing the reach of affordable data services to the masses. To achieve this, all stakeholders need to work in tandem and drive service adoption. It is only then that India will be able to bring the much needed digital kranti and ensure digital transformation in the lifestyles of every Indian.

This report has been produced with inputs from the FICCI Communications and Digital Economy Committee, which included stakeholders from across the sector’s value chain. It aims to highlight the key challenges faced by industry players and provide actionable recommendations to foster growth in the sector.
Summary of recommendations:

- **Provide adequate spectrum at reasonable prices:** A clear road-map of spectrum availability with a rational pricing structure needs to be developed. Additional spectrum should be made available to support the growth of mobile broadband. Sufficient access and microwave spectrum for backhaul should be made available.

- **Rationalize taxes and levies:** Taxes and levies on telecom services should be rationalized to ensure overall growth and financial viability of the sector. Retrospective amendments in laws need to be discouraged, and all changes should be forward-looking as a principle. Additionally, the funds collected under USOF should be efficiently utilized.

- **Provide uniform policies for deploying telecom infrastructure:** There should be uniform RoW policy across all states with a uniform and reasonable cost structure. Moreover, a single window mechanism should be provided for granting RoW permissions. Also, the private sector needs to be incentivized to provide last mile connectivity in rural areas.

- **Provide a fillip to manufacturing ecosystem:** There is a need to strengthen the telecom equipment and handset manufacturing ecosystem in India through incentives, and rationalization of taxes and levies.

- **Establish robust standards for security and privacy:** Clear rules relating to security standards should be set to help reduce uncertainty for equipment providers, and service providers. The Government, industry and related global standards bodies should coordinate to establish protocols for standardization, interoperability and performance of connected devices.

- **Address security and governance issues of internet:** There is a need for an overarching multi-stakeholder oversight body, which deals with all matters relating to cyber security and amalgamates the work done by different agencies. A principles-based approach to surveillance is required, so that trust among internet community is not lost.

- **Establish policy framework to boost emerging services of cloud and M2M:** It is important to put in place clear regulatory frameworks to set up a solid foundation for these services such as cloud and M2M to prosper. There should be a single nation-wide policy on data centers for providing cloud services, avoiding regional/state-wise difference in regulations.

### Financing needs

- A Telecom Finance Corporation should be set up on the same principle as that of the Power Finance Corporation.

- USOF fund needs to be eliminated or reduced to 1%-3%, and the funds already collected under USOF should be efficiently utilized.

### Spectrum availability

- All spectrum currently lying unutilized with various government agencies should be made available on priority in conformity with globally harmonized bands.

- Spectrum usage charge should be revised and reduced to 1%, given that spectrum is allocated at market-determined prices.

### Taxes and duties

- Bring handsets under provisions of “Goods of Special Importance” under the Central Excise Tax Act, 1956; therefore, capping the maximum VAT that can be levied by states at 5%

- Shift National Calamity Contingent Duty (NCCD) of 1% from mobile phones to other goods, to share levies equitably among industries.

### Local manufacturing

- Minimum interest subsidy of 5% on all fixed capital investments for entire Electronic System Design and Manufacturing (ESDM) sector on the lines of benefits given under Technology Upgradation Fund Scheme (TUFS).

- Ten-year tax holiday on a block of 15 years on all profits and gains for manufacturing in the mobile phone industry.

### RoW and other impediments to telecom tower installation

- The DoT guidelines should be incorporated in the statutory framework and rules in line with the 53rd parliamentary committee report. State governments should be mandated to follow the guidelines through suitable legislation or direction.

- Adopt uniform RoW across all states at a uniform and reasonable cost.
1. Digital India: leveraging ICT to create a knowledge based economy
1.1 Vision Digital India as an enabler for digital revolution

Over the past two decades, ICT sector has played a transformational role in the socio-economic development of India. Today, the country is standing at the cusp of a digital revolution. With the Indian government’s vision of a Digital India, the country has embarked on a focused journey to bring digital transformation in the lives of all its citizens.

Approved in August 2014 by the Indian Government, the Digital India program aims to transform the country into a digitally empowered society and knowledge economy. It focuses on making technology central to enable this transformation. It is planned to be implemented in phases till 2018.

Digital India is an umbrella program to attain ICT infrastructure targets such as of broadband and mobile connectivity in the country, and further enable provision electronic delivery of government services to citizens. It is coordinated by DeiTY and implemented by the Government.

With this initiative, the Government aims to empower citizens with the power of internet. It seeks to create a digital interface between the Government and citizens and provide a plethora of e-governance services including health care, education and banking to bring transparency in the system and enable inclusive growth.

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**Figure 1: Key areas identified to realize the Digital India vision**

<table>
<thead>
<tr>
<th>1</th>
<th>Digital infrastructure as a utility to every citizen</th>
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<tbody>
<tr>
<td>1</td>
<td>High speed internet as a core utility</td>
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<td>2</td>
<td>Cradle-to-grave digital identity – unique, lifelong, online, authenticable</td>
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<td>3</td>
<td>Mobile phone and bank account enabling participation in digital and financial space</td>
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<td>4</td>
<td>Easy access to a common service centre</td>
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<td>5</td>
<td>Shareable private space on a public cloud</td>
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<td>6</td>
<td>Safe and secure cyberspace</td>
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<th>2</th>
<th>Governance and services on demand</th>
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<tr>
<td>1</td>
<td>Seamlessly integrated across departments or jurisdictions</td>
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<td>2</td>
<td>Services available in real time from online and mobile platform</td>
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<td>3</td>
<td>All citizen entitlements to be available on the cloud</td>
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<td>4</td>
<td>Services digitally transformed for improving ease of doing business</td>
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<td>5</td>
<td>Making financial transactions electronic and cashless</td>
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<td>6</td>
<td>Leveraging GIS for decision support systems and development</td>
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<th>3</th>
<th>Digital empowerment of citizens</th>
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<tr>
<td>1</td>
<td>Universal digital literacy</td>
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<td>2</td>
<td>Universally accessible digital resources</td>
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<td>3</td>
<td>All documents or certificates to be available on cloud</td>
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<tr>
<td>4</td>
<td>Availability of digital resources and services in Indian languages</td>
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<tr>
<td>5</td>
<td>Collaborative digital platforms for participative governance</td>
</tr>
<tr>
<td>6</td>
<td>Portability of all entitlements through cloud</td>
</tr>
</tbody>
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"We should dream of a Digital India. Digital India is a dream for the poor, with broadband connectivity, we can ensure long-distance education...Digital India is plan not for the benefit of the rich, but the poor...e-governance is easy governance, efficient governance, and that is important”

- Mr. Narendra Modi
Prime Minister of India, 15 August 2014

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Source: DeiTY
1.2 Need for digital quotient to enable inclusive growth

The ICT sector, which includes telecom operators, internet service providers, computer hardware and software developers, content generators, application providers and equipment manufacturers, is playing an increasingly important role in the global economy today. Research and implementation around the world have consistently demonstrated that investment in ICT positively affects jobs, productivity, GDP growth, and innovation.¹

There is a direct correlation between ICT development – the availability of telecom, broadband, computers, and software in a country – and the overall economic growth of a country. Top-ranking countries in terms of ICT development have the highest GDP levels, which indicates that implementation of ICT in a country improves its overall economic health.

Despite its significance in the overall development of an economy, ICT readiness has remained low in India. India lags behind in terms of infrastructure development, and ICT has the potential to play the role of an alternative infrastructure. With its wide reach and increasing affordability, it has evolved as a basic infrastructure such as electricity, roads, water, and also bridged the urban-rural gap in terms of communication infrastructure.

Figure 2: ICT development* vs GDP per capita#

![Graph showing ICT development index rank vs GDP per capita](image)

Source: ITU, World Bank

¹“ITU ICT development index rank 2013; World Bank GDP per capita (US$) 2013 (at current prices)

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In addition to economic benefits, ICT can be a leveler to bridge the urban-rural divide. It fosters social development including improved education, health and increased citizen participation in civil society. In India, health care, education, the reach of financial services and rural development are key priorities to increase social inclusiveness in the country.
Figure 4: ICT in governance and social development

**ICT in health care**
- Remote monitoring and diagnostic
- Reduce physician visits and overall delivery cost
- Healthcare worker education
- Increasing health awareness
- Health record maintenance
- Reduce default for medicines

**ICT in finance**
- Heightened financial access
- Government subsidy schemes
- m-payment/m- transactions
- Remittances
- Micro insurance
- Small scale savings account

**ICT in agriculture**
- Live market rates and information
- Best practices and farmer education
- Weather forecast update
- Reduce supply chain inefficiencies
- Micro-insurance for crops
- Remote irrigation

**ICT in education**
- Online courses/self-learning solutions
- Distance learning programs
- Online vocational trainings
- Teaching aids
- Teacher re-training

Source: EY analysis
1.3 Government’s framework to deliver objectives of Digital India

With the Digital India program, the country is expected to realize the direct and cascading benefits of ICT. In essence, it knits together several existing and new ICT programs – which are currently housed within various ministries or departments such as telecom and IT, railways, rural development, home, defence and urban development – under a unified branding. It seeks to restructure and re-focus on these schemes and implement them in a synchronized manner.

The Government has developed a framework of nine pillars for the Digital India program, detailing the targets, estimated timelines and costs associated with end-goals. Together, these are expected to facilitate government’s engagement with the public, enable provision of e-services on demand, offer wider access to internet, mobile connectivity, banking infrastructure and ensure overall availability of key digital resources to all citizens.

Figure 5: Nine pillars of Digital India

1. **Broadband highways**: With an estimated capex of INR476.9 billion, this pillar seeks to address the objectives of broadband for all rural and urban areas in the country, as well as create a National Information Infrastructure by March 2017. Rural broadband access includes coverage of 250,000 gram panchayats (GP) by December 2016 in a phased manner. For urban broadband access, it seeks to facilitate virtual network operators and mandate communication infrastructure in new urban development for smart buildings in cities.

2. **Universal access to mobile connectivity**: With an estimated capex of INR160 billion, this pillar seeks to increase network penetration and cover current gaps in mobile connectivity. It aims to cover remaining 42,300 villages by FY18.

3. **Public internet access program**: With an estimated capex of INR47.5 billion, this program seeks to cater to the objectives of National Rural Internet Mission and have common service centers in 250,000 villages by March 2017. It also aims to develop 150,000 post offices as multi-service centers in the country.

4. **E-governance – reforming government through technology**: With this initiative, the government seeks to undergo a business process re-engineering using IT to improve its transactions. It aims to simplify forms, create online repositories for school certificates and IDs, integrate services and platforms (such as Adhaar and payment gateway) and automate government workflow and public grievance redressal processes.
5. **eKranti – electronic delivery of services**: This pillar aims to involve technology for delivery of services in multiple facets such as for e-education using broadband, free Wi-Fi, online courses; e-health care through online consultation, records, medicine supply; for online banking, cash, loans and real time price information for farmers; financial inclusion; e-courts, e-police, e-prosecution; cyber security and much more.

6. **Information for all**: This includes online hosting of information and documents, use of social media by the government to proactively engage with the citizens and online messaging on special occasions or programs.

7. **Electronics manufacturing – target net zero imports by 2020**: This initiative seeks to fine-tune multiple ongoing programs to develop the electronics manufacturing ecosystem in the country. It has a specific focus on semiconductor fabrication plants, fab-less design, set-top boxes, VSATs, mobiles, consumer and medical electronics, smart energy meters, smart cards and micro-ATMs.

8. **IT for jobs**: With an estimated cost of INR2.0 billion, this initiative seeks to train 10 million people in towns and villages for IT sector jobs in five years. It also aims to train 0.3 million agents to run viable businesses delivering IT services. Additionally, the project involves training of 0.5 million rural IT workforce in five years and setting up of BPOs in each Northeastern state.

9. **Early harvest programs**: The Digital India program houses several early harvest programs, which are under various phases of implementation. These include initiatives such as on use of IT platform for mass messaging and e-greetings from government, biometric attendance, standardized government e-mail designs, e-books for schools and national portal for lost and found children. It also includes programs to cover cities with more than 1 million population and tourist centers with public Wi-Fi hotspots, an INR7.9 billion project to provide Wi-Fi in all universities and an INR980 million project to have secure e-mail for use within government systems.

---

**Figure 6: Estimated impact of Digital India**

- **India gaining leadership in adoption and manufacturing of IT products and services**
  - India will be a leader in IT use in services - health, education, banking
  - E-governance and e-services: across government
  - Net zero imports by 2020

- **Providing internet access to all**
  - Broadband in 250,000 villages, universal phone connectivity
  - 400,000 public internet access points
  - Wi-Fi in 250,000 schools, all universities; public Wi-Fi hotspots for citizens

- **Empowering citizens with digital inclusion and job opportunities**
  - Digitally empowered citizens - public cloud, internet access
  - Digital inclusion: 17 million trained for IT, telecom and electronics jobs
  - Job creation: 17 million direct and at least 85 million indirect

Source: DeitY
Overall, the Digital India program is expected to cost approximately INR1,130 billion. This includes around INR1,000 billion in ongoing schemes of DeiTY and DoT (not considering those in other line ministries) and around INR130 billion for new schemes and activities.

Timely implementation of schemes and adequate funding are essential to achieve the Government’s ambitious program. Additionally, collaboration between different stakeholders is also important to enable proliferation of affordable solutions to the price-sensitive Indian consumer market and drive service adoption.

Though the program is in early stages, it has garnered considerable attention from all stakeholders. The vision looks promising, and the time is ripe for Digital India. The Government’s focused plan to leverage ICT to create a digitally empowered knowledge-based economy has spurred growth opportunities and investments in the sector. This is expected to bring the much needed thrust to boost ICT and socio-economic development in the country.
“Cities in the past were built on riverbanks. They are now built along highways. But in the future, they will be built based on availability of optical fibre networks and next-generation infrastructure... Why can’t we have 100 new smart cities in our country, all modern cities with concepts like ‘walk to work’ etc?”

~ Prime Minister of India, Mr. Narendra Modi

The Government has envisioned a goal to build 100 smart cities in the country. The proposal received approval form the Union Cabinet in April 2015, and is set to receive INR480 billion over five years for developing these smart cities.

Development of smart cities hinges on the strength and progress of underlying communications infrastructure, which enables delivery of various services such as e-governance, e-learning, online medical assistance and smart metering.

However, as compared to countries with top smart cities, India is currently one of the least penetrated telecom markets. The Government’s vision for Digital India and smart cities is expected to stimulate ICT development in the country.

As part of the bigger picture of creating industrial corridors between major metropolitan cities in the country, smart cities are being developed in collaboration with foreign governments. India has teamed up with multiple countries such as Japan, Qatar, Russia, Singapore, the UAE, the UK and the US to use their expertise in building smart cities and to cater to funding requirements.

Telcos’ use cases in smart cities range from providing basic connectivity, which is essential for capturing data from sensors and delivering real-time information to consumers, to providing an overall solution, such as by systems integration with other ICT, cloud and M2M solutions. In India, telcos will play a vital role in deploying the backbone network infrastructure of smart cities by providing connectivity through fiber optic and wireless media.

India is the least penetrated telecom market as compared to global top smart cities countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Population (million)</th>
<th>Percentage of individuals using internet (%)</th>
<th>Fixed broadband penetration (%)</th>
<th>Mobile broadband penetration (%)</th>
<th>Smartphone penetration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>1,320.3</td>
<td>15.1</td>
<td>1.2</td>
<td>9.1</td>
<td>7.3</td>
</tr>
<tr>
<td>US</td>
<td>318.9</td>
<td>84.2</td>
<td>25.5</td>
<td>90.2</td>
<td>59.0</td>
</tr>
<tr>
<td>Japan</td>
<td>127.1</td>
<td>86.3</td>
<td>28.8</td>
<td>96.0</td>
<td>78.0</td>
</tr>
<tr>
<td>France</td>
<td>66.3</td>
<td>81.5</td>
<td>38.0</td>
<td>96.5</td>
<td>56.0</td>
</tr>
<tr>
<td>UK</td>
<td>62.7</td>
<td>89.5</td>
<td>35.7</td>
<td>96.1</td>
<td>65.6</td>
</tr>
<tr>
<td>South Korea</td>
<td>49.0</td>
<td>84.8</td>
<td>38.0</td>
<td>98.2</td>
<td>76.5</td>
</tr>
<tr>
<td>Switzerland</td>
<td>8.1</td>
<td>86.7</td>
<td>43.0</td>
<td>97.0</td>
<td>75.3</td>
</tr>
<tr>
<td>Norway</td>
<td>5.1</td>
<td>95.1</td>
<td>36.4</td>
<td>91.4</td>
<td>90.2</td>
</tr>
<tr>
<td>World</td>
<td>7,174.6</td>
<td>37.9</td>
<td>9.4</td>
<td>29.8</td>
<td>22.3</td>
</tr>
</tbody>
</table>

Source: Note1: CIA World Factbook, July 2014 estimate; Note2: ITU, 2013; Note3: per 100 inhabitants, ITU, 2013; Note4: by population, Ovum, 2013; Note5: by population, Ovum, 2013; KPCB Internet trends 2014; Factiva; “Smart City Index & Development,” Institute for Information Industry - Taiwan, 2010; EY analysis
2. Telecom services
The Indian telecom industry is deemed to be a remarkable growth story for Indian industries and is recognized in the global arena for its contribution in development of the country’s economy. The telecom sector is the third-highest FDI contributor (after services and construction) over the period FY2000-till date, attracting INR837 billion of investment. It has also played a significant role in the socio-economic development of the country by connecting the masses.

However, in the recent years, the sector has witnessed a difficult business environment. During 2008-2013, the recessionary global environment, coupled with the regulatory overhang witnessed by the sector, dampened investors’ sentiments and its growth potential.

2.1 Telecom growth and current market landscape

The growth of Indian telecoms can be attributed to several enabling factors. Foremost, liberalization of telecommunications in 1991, which opened up the sector to private participation, was a key game changer. Subsequently, regulatory and policy reforms such as the implementation of the National Telecom Policy 1994, award of cellular licenses and establishment of the Telecom Regulatory Authority of India (TRAI) in 1997 were some of the important milestones in the 1990s, which propelled the sector to a high-growth trajectory.

The launch of wireless services was an important landmark and one of the most important drivers of overall industry growth during the past two decades. Additionally, factors such as India’s large population, high economic growth in the country, intense competition in the sector, low tariffs, infrastructure sharing and the introduction of enabling regulatory reforms have played a notable role in the industry’s growth.

Figure 7: Overall subscriber base and teledensity

![Graph showing overall subscriber base and teledensity](image)

Source: TRAI

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2Department Of Industrial Policy & Promotion
The telecom revolution has benefitted rural as well as urban segments, and has become both a necessity and a development enabler. Currently, telecom connects the remotest of Indian regions, which remain unpenetrated by road or the railways. Despite its growth in rural regions, its overall growth remains skewed toward urban subscribers, which account for around 58.6% of the overall subscriber base. The urban-rural digital divide is significant, with a teledensity of 149.3% in urban areas and as low as 47.2% in rural areas at the end of February 2015.6

Wireless dominated the overall subscriber growth, accounting for 97.3% of the overall subscriber base as of February 2015.5 The high capex requirement for laying wireline networks, coupled with inexpensive availability of wireless handsets, has led to a decline in wireline growth.

India’s telecom sector is a voice-centric market, characterized by high volumes and low average revenue per user (ARPU). Price-sensitivity of telecom products in India has resulted in low airtime tariffs — average tariff per outgoing minute being INR0.5 per minute.6 Unsustainable tariffs and competition to add new subscribers has also impacted operator margins.
2.1.1 Market landscape

Wireless

Wireless services have been at the helm of the Indian telecom growth story. With 960.6 million subscribers at the end of February 2015, India is the second-largest wireless market in terms of subscribers after China. The country’s wireless market has been dominated by volume-based growth. Furthermore, affordability of wireless services, with one of the lowest mobile tariffs in the world, has led to an aggressive growth of mobile telephony. India’s urban wireless teledensity stood at 143.7%, while its rural teledensity remained low at 46.6%, at the end of February 2015.7

Figure 10: Wireless subscribers in India

India’s wireless market began to record a systematic shift with the launch of 3G services in 2010. Operators began moving away from focusing on voice services and began to capitalize on the growth and revenue potential of data. Wireless broadband services – 3G and 4G – are likely to replicate the growth of voice telephony in the growth of internet and broadband, and will account for largest share of incremental revenues for the sector.

Wireline

India’s wireline market has been reporting a constant decline for more than a decade now. The growth in the demand for wireless services, coupled with low-cost access to wireless devices and affordable tariffs, have significantly reduced the attractiveness of wireline services for consumers. Wireline teledensity stood at a low 2.1% at the end of February 2015.8

However, demand for wireline services has witnessed renewal of some interest in the recent past given its importance in broadband delivery. Some of the private players have reported healthy addition of wireline subscribers, along with an uptick in APRU, led by a demand for high speed broadband.
2.2 Overview of internet and broadband market

Broadband infrastructure plays a critical role in an economy and contributes significantly to the social progress and development of a country. It connects consumers, businesses, governments; facilitates social interaction and presents attractive opportunities for education, governance and entrepreneurship.

Countries across the world are looking to increase broadband access and view it as the next phase of growth in telecommunications services. Broadband offers extensive benefits to emerging markets. According to the World Bank’s estimates, a 10% increase in broadband penetration accelerates economic growth by 1.38% in low and middle income countries as compared to an increase of 1.21% in high-income countries.10

Till recently, India was primarily dependent on wireline infrastructure for delivery of internet services. Due to the deficient nature of the fixed infrastructure, the internet penetration has remained low and India ranks a lowly 125th in terms of fixed broadband penetration globally.11 However, the last couple of years have witnessed significant uptake of wireless internet services, led by operator initiatives to invest in spectrum acquisition and network upgrades. As of September 2014, wireless accounted for ~92.6% of the country’s total internet subscribers.12

Figure 11: Wireline subscriber numbers and growth rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Subscribers (million)</th>
<th>y-o-y growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY09</td>
<td>38.0</td>
<td>-3.6%</td>
</tr>
<tr>
<td>FY10</td>
<td>37.0</td>
<td>-2.6%</td>
</tr>
<tr>
<td>FY11</td>
<td>34.7</td>
<td>-6.2%</td>
</tr>
<tr>
<td>FY12</td>
<td>32.1</td>
<td>-7.5%</td>
</tr>
<tr>
<td>FY13</td>
<td>30.2</td>
<td>-5.9%</td>
</tr>
<tr>
<td>FY14</td>
<td>28.5</td>
<td>-5.7%</td>
</tr>
<tr>
<td>Feb-15</td>
<td>26.7</td>
<td></td>
</tr>
</tbody>
</table>

Source: TRAI

Figure 12: Internet subscribers (million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total internet subscribers</th>
<th>Wireless internet subscribers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-13</td>
<td>164.8</td>
<td>143.2</td>
</tr>
<tr>
<td>Jun-13</td>
<td>198.4</td>
<td>176.5</td>
</tr>
<tr>
<td>Sep-13</td>
<td>210.4</td>
<td>188.2</td>
</tr>
<tr>
<td>Dec-13</td>
<td>238.7</td>
<td>220.4</td>
</tr>
<tr>
<td>Mar-14</td>
<td>251.6</td>
<td>233.1</td>
</tr>
<tr>
<td>Jun-14</td>
<td>259.1</td>
<td>240.6</td>
</tr>
<tr>
<td>Sep-14</td>
<td>254.4</td>
<td>235.7</td>
</tr>
</tbody>
</table>

Source: TRAI

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9Speed greater than 512 Kbps
10World bank analysis
11Telecom Regulatory Authority of India
12Ibid.
Future investment in wireless and fixed infrastructure

The growth trend in broadband is changing, and wireless broadband is expected to drive mass adoption. Due to relatively low capex, availability of affordable customer premise equipment and reduced time for roll-out, wireless broadband is expected to increase proliferation of broadband services.

Governments around the world are encouraging investment to boost the proliferation and availability of high speed broadband. The Government of India has envisaged driving broadband demand by advocating provision and support of easy, affordable and reliable broadband access to the masses. The NTP 2012 envisages 600 million broadband subscribers by 2020.

High-quality broadband will also require the substantial growth of fixed infrastructure for backhaul of wireless access and high speeds in dense urban areas through fiber (fiber to the x (FTTx)) and cable broadband. Developed economies have seen extensive deployment of FTTx and the technology has served as a platform for data growth, despite the presence of mature mobile broadband platforms in the countries. Moreover, developments in VDSL2 such as vectoring and the new G.fast standards are further changing the landscape of fixed broadband globally.

Worldwide, cable broadband caters to 20% of the demand for broadband, while in India, only 5% of broadband connections are provided via cable.\(^{13}\) In contrast, cable TV connections in India, as last mile infrastructure, reach more people than the telephone copper infrastructure.\(^{14}\) With mandatory conversion of cable to digital networks in major cities, the freed up capacity can serve as last mile for metro connectivity.

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\(^{13}\)Telecom Regulatory Authority of India

3G and 4G

The Government of India has recognized the importance of wireless broadband and the 3G/BWA auction in 2010 was a significant step for the Indian telecom sector. 3G services, which were launched in 2010, were slow to gain traction in initial years. However, the past two years have seen strong upswing in demand for 3G, with all operators reporting strong growth both in terms of subscriber addition and data usage.

Given the demand, the Government had taken the decision of releasing additional spectrum in the 2100MHz band in the recently concluded auction (March 2015). Moreover, the spectrum swap agreement signed between Department of Telecom and the Ministry of Defence, which will bring 15MHz of additional 2100MHz spectrum into commercial use is a noteworthy achievement. Furthermore, operators have started evaluating the use of their liberalized spectrum holdings in the 900MHz band for the launch of 3G services. 900MHz band can be instrumental in expanding the 3G services to the hinterland, given its superior propagation characteristics.

4G services in India were launched in 2012, and the current year is likely to witness large scale 4G roll-out from some key players, with the momentum expected to build in the coming years. Earlier, only operators that won spectrum in 2300MHz in 2010 could launch 4G services. However, the auction of technology neutral spectrum in February 2014 and March 2015 is likely to change the landscape of 4G in India. These auctions saw operators winning spectrum in 800MHz and 1800MHz bands, two amongst the most developed bands for launch of long-term evolution (LTE) services.

Furthermore, the auction of 700MHz digital dividend band in the next couple of years will also boost availability of 4G services in the market. However, the ability of 4G services to disrupt the existing market dynamics will hinge on several factors including price sensitivity of services, strength of the supporting ecosystem and the capability to deliver voice services.

On the demand side, affordability of services and availability of relevant local content are expected to generate a significant pull. India, with its young and increasingly urban population base, has huge potential for growth. Moreover, growing usage of smartphones, especially in urban areas, is driving usage of internet on hand-held devices.

2.3 Challenges in the current scenario and the way forward

2.3.1 Financial issues: an overview

The Indian telecom industry is currently facing a challenging financial environment. Its burgeoning industry debt is a rising concern. In FY14, the sector’s total sector debt stood at INR2,500 billion – higher than the industry’s gross revenue of INR2,338.5 billion. The sector’s rising debt-equity ratio is also a key concern. Furthermore, financial over-leveraging, largely on account of the high costs of spectrum pay-outs, exerted a downward pressure on revenues and earning capacities in the industry.

Figure 15: High debt-equity ratio in telecom sector a key concern

In addition, multiple taxes and levies have added to the financial woes of operators. Currently, levies account for around 30% of revenue earned by telecom companies in India, as compared to around 5% in other APAC countries.

High price-related competition and low tariffs have also led to low ARPs exerting pressure on margins. These issues are likely to further decelerate operators’ investments and put a brake on their plans to expand their networks and provide new services.

15“Telecom industry cracking under financial pressure,” The Hindu, 11 July 2013; Telecom Regulatory Authority of India; EY Analysis
16Cellular Operators Association of India
2.3.1.1 Taxes and levies

India’s telecom sector is subject to one of the world’s highest net outlays in the form of regulatory costs including, but not limited to, Service Tax, state-level VAT, spectrum charges and license fees as well as other charges including Additional Duty of Customs (ADC), Central Sales Tax (CST), municipal charges, right of way, etc.). In FY13, spectrum and license fees (two of the largest regulatory pay-outs) together amounted to INR171.4 billion, while for FY14 the figure rose to INR214.4 billion. This highlights the substantial burden on the sector due to these levies.

Figure 16: Regulatory pay-outs of India’s telecom sector (INR billion)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>License fees</td>
<td>117.9</td>
<td>114.6</td>
<td>146.3</td>
</tr>
<tr>
<td>Spectrum fees</td>
<td>51.9</td>
<td>56.8</td>
<td>68.1</td>
</tr>
<tr>
<td>Total license and spectrum fee pay-outs</td>
<td>169.8</td>
<td>171.4</td>
<td>214.4</td>
</tr>
<tr>
<td>AGR</td>
<td>1,345.90</td>
<td>1,407.80</td>
<td>1,580.4</td>
</tr>
<tr>
<td>License and spectrum fees as a percentage of AGR (%)</td>
<td>12.6</td>
<td>12.2</td>
<td>13.6</td>
</tr>
</tbody>
</table>

*Anticipated
Source: DoT, TRAI

Moreover, Indian taxes are much higher in comparison to its global peers. Spectrum usage charges (SUC) in most countries recover spectrum charges through an up-front payment in auctions and do not levy any supplementary charge. Even in cases where a fee is levied, it only covers the administrative cost of managing the spectrum.

In the case of license fees, India outstrips its global counterparts. For instance, China does not levy any license fees; in Singapore, it varies between 0.8%-1% of the annual turnover. Similarly, license fees are negligible in South Africa (0.15%-0.35% as a percentage of revenue from licensed services) and Thailand (a maximum 1.5% of annual revenue). There is a need for the Government to revisit and revise these levies, since they adversely affect the sector’s growth. Research indicates that a one percentage point reduction in taxes on mobile broadband is likely to result in up to 1.8 percentage point increase in penetration, and up to 0.7 percentage point increase in GDP over five years in emerging markets. Specifically for wireless broadband, every dollar reduced in taxes for emerging markets, will generate GDP ranging between US$1.4 and US$12.6.

2.3.1.2 Retrospective taxation

Retrospective amendments of tax norms are among the biggest challenges faced by companies in India’s telecom sector. Two significant changes were introduced in the Finance Act 2012. These have dented investors’ confidence in India as an investment destination. These changes include the following:

- Retrospective taxation of deals between two overseas parties of an entity based in India with effect from 1 April 1962.
- Expansion of the definition of “royalty” retroactively from 1976 to include any consideration received for computer software and transmission by satellite, cable, optic fiber or similar technology.

17Telecom Regulatory Authority of India
19TRAI
20“Types of Telecoms Licenses and Their Fees,” National Broadcasting and Telecommunications Commission, http://www.nbtc.go.th/wps/portal/NTC/ut/p/c4/G4_5BBKbxLLM9M5SzPy8xZB9CP0os3jyTTMX0wB3U08n8zAIA8BwzXNMb9PA1MZ2c2Cy0EdFAlKkngi/7WCM_GLOBAL_CONTEXT=’/wps/wcm/connect/library+site\internet/site\en\en\interesting\articles\en\interesting\articles\detail/925419004000c63768dd5c6abc63bcb, accessed 16 April 2014.
22Ibid.
Retrospective laws have proved to be a disincentive for existing and new companies that wish to do business in India. Such changes in laws create an environment of mistrust, unreliability and instability. They also lead to deterioration in investors’ confidence and unpredictability in the business environment. Some key ICT players in the country are involved in prolonged litigation due to retrospective taxation assessments.

Retrospective amendments made in laws need to be discouraged, and all changes should be forward-looking as a principle. It is important to improve the regulatory setup, drive enhanced transparency in communication between government agencies and regulatory authorities, and discontinue retrospective amendments in tax laws in the country.

**Key recommendations**

- Retrospective taxation issues need to be resolved, since they hurt investors’ confidence.

2.3.1.3 Contribution to USOF fund

Another area of concern constitutes high charges levied in the form of the Universal Service Obligation Fund (USOF). NTP 1999 had envisaged access to basic telecom services for all Indians at affordable prices, especially in rural and remote areas. In 2002, the Universal Service Support policy came into effect, with a universal service levy of 5% on the AGR, which forms a part of the license fee. Over the past few years, the high quantum of this levy and its suboptimal utilization has been a major concern.

Although the USOF was created with the aim of promoting rural telephony, the fund’s rules are too cumbersome and lack focus. They do not reflect the fact that USOF subsidies are perhaps most urgently required to defray the cost of infrastructure creation in rural areas. Moreover, the high levy of 5% (one of the highest among India’s peers) continues to be imposed in the country, even though the fund contains INR356.1 billion of unutilized accumulated funds.

**USOF fund’s contribution for select Asian countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>USOF fund contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>5% of Adjusted Gross Revenue</td>
</tr>
<tr>
<td>Nepal</td>
<td>2% levy on revenues of incumbent operators, ISPs and mobile operators</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1.5% levy on revenues of all operators</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1% of audited gross revenues</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>2.5% of net revenues of all licensed service providers</td>
</tr>
</tbody>
</table>

Source: GSMA

Operators have already met their original roll-out obligations for rural areas. However, the Government has unilaterally mandated additional roll-out obligations that require the coverage of block headquarters (BHQs). Failure to meet these roll-out obligations has financial implications for operators in the form of penalties. The USOF fund’s contribution, along with the penalties, is equivalent to a “double levy” on operators. It should be noted that the USOF fund in India is among the highest in the world. India had the second-highest accumulated USO fund level in the world (next only to Brazil) and the highest among its APAC peers.

![Figure 17: Status of disbursement of USO levy on operators in India](image-url)
## Case study: Best practices in USOF fund management

<table>
<thead>
<tr>
<th>Best practices</th>
<th>Country</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation with stakeholders</td>
<td>Ghana</td>
<td>Board of trustees for fund includes a representative from each major telecom operator.</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
<td>Operators have representation in and their input is sought by the fund oversight committee. Detailed public consultations are conducted.</td>
</tr>
<tr>
<td>Autonomous/independent fund structure</td>
<td>Nigeria</td>
<td>There is a separate entity (USPF); board of directors comprises representatives from private and public sectors.</td>
</tr>
<tr>
<td>Clearly specified and measurable objectives including coverage and service delivery targets</td>
<td>Columbia</td>
<td>The country has in place a four-year plan with detailed project descriptions, targets and associated costs.</td>
</tr>
<tr>
<td></td>
<td>Peru</td>
<td>Annual report is generated on fund's performance with respect to allocation and performance of projects versus targets.</td>
</tr>
<tr>
<td>Fair project allocation process – competitive bidding</td>
<td>Columbia</td>
<td>Names and details of successful bidders are posted on the website.</td>
</tr>
<tr>
<td></td>
<td>Nigeria</td>
<td></td>
</tr>
</tbody>
</table>

Source: GSMA

TRAI, in its recent recommendations on definition of AGR, has highlighted the inefficiencies in utilization of USO funds, and stated that the fund is being used to provide budgetary support and bridge the fiscal gap. The regulator also stated that the USO levy needs to be reduced to 3% of AGR for all licenses.

### Key recommendations

- USOF needs to be eliminated or reduced to 1%-3%.
- Funds collected under USOF need to be utilized efficiently.
- Unilateral application of additional requirement of BHQ coverage needs to be revisited.

### 2.3.1.4 Revision of AGR definition

Interpretation of the definition of AGR, which is used as the base for levy of licence fees and SUC, has long been an issue of contention. There is a disconnect between operators and the Government over what should constitute the AGR. Under the current regime, revenue accrued from non-telecom related activities is included for calculating AGR.

Revenue considered for calculating AGR should only be that which is derived from users of telecom services/sale or lease of bandwidth or receipt from sale of value-added services permitted under the conditions of the licence.

Moreover, the current definition of AGR is ambiguous and allows anomalies — includes revenues unrelated to licensed

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23“Enabling the next wave of telecom growth in India,” EY, 2011.
24“Collection of Universal Access Levy vis-a-vis Allocation and Disbursement of Funds from USOF,” USOF website, accessed 6 May 2014.
activities, accounting credits that strictly do not fall under the definition of revenue or income, dual charge of the same revenues twice in the hands of different operators, etc. Given the contentious nature of the dispute, it is imperative that such inconsistencies in the AGR definition are removed.

**Figure 18: Inconsistences in the current definition of AGR**

<table>
<thead>
<tr>
<th>Inconsistences</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Includes several revenues unrelated to licensed activities under the licence</td>
</tr>
<tr>
<td>2.</td>
<td>Includes service items that do not strictly come under the definition of revenue</td>
</tr>
<tr>
<td>3.</td>
<td>Results in dual charge of the same revenue twice in the hands of different operators</td>
</tr>
<tr>
<td>4.</td>
<td>Includes notional income that is unrealized/remains uncollected by licensee</td>
</tr>
<tr>
<td>5.</td>
<td>Includes item on accrual/billed basis, but allows deduction on collected/paid basis</td>
</tr>
</tbody>
</table>

*Source: TRAI, EY analysis*

**Key recommendations**

- AGR should only include revenues from services under license for respective service areas.
- A simple, non-ambiguous definition of AGR should be in place for the future.

### 2.3.1.5 Need for finance in telecom sector

The financing needs of the telecom sector are increasing rapidly with the rising cost of input required. India has been witnessing high payouts for acquisition of spectrum at all the airwave auctions since 2010. Moreover, with debts mounting on operators’ balance sheets, Indian banks have also been reluctant to lend money to the sector.

The Twelfth Five Year Plan projected investments of around INR94 billion in the telecom sector. However, it is envisaged that more than 90% of these investments will be from the private sector. This is a difficult proposition, given that operators’ balance sheets are already stretched.

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27Ibid.
Figure 19: Twelfth Five Year Plan projections on investment in the telecom sector

<table>
<thead>
<tr>
<th></th>
<th>Total Eleventh Plan</th>
<th>Twelfth Plan projections (INR billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre</td>
<td>8.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Private</td>
<td>29.8</td>
<td>9</td>
</tr>
<tr>
<td>Total Telecommunications</td>
<td>38.4</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Source: Planning Commission

Figure 20: FDI flow into telecom sector

<table>
<thead>
<tr>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
<th>FY14</th>
<th>FY15*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,558</td>
<td>2,554</td>
<td>1,665</td>
<td>1,997</td>
<td>304</td>
<td>1,307</td>
<td>2,832</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
<th>FY14</th>
<th>FY15*</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.3%</td>
<td>9.8%</td>
<td>8.6%</td>
<td>5.4%</td>
<td>1.3%</td>
<td>5.3%</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

* till January 2015
Source: DIPP, Ministry of Commerce and Industry

This is cause for a major concern, since telecom is a capital intensive sector. The need for financing is bound to rise, given the massive outlay required to acquire spectrum. It is estimated that the recently concluded round of spectrum auctions (March’15) will add an additional debt of ~INR1,000 billion on the industry. Moreover, rollout of next generation 4G services and expansion of 3G services will require additional investment by operators.

In this scenario, it is essential for the Government to support the financing needs of the sector, which has played an important role as an essential infrastructure, and contributed significantly to the growth of India's economy.
Figure 21: Capital investment (gross block)

Setting up of Telecom Finance Corporation

The sector should be allowed to access funding on a preferential basis from government-promoted institutions financing the infrastructure sector. The Government should consider the creation of a Telecom Finance Corporation (TFC) as a vehicle to enable the sector to access funds on a preferential basis. TFC can be structured and serve the same purpose as the Power Finance Corporation. It should extend credit to the sector at competitive rates to facilitate its funding needs.

Increase in ECB limit

- **For high capex requirements**: Significant capex investment is required to achieve targets envisaged in NTP 2012. Enabling players to fund this capex through ECB rather than through high-cost rupee loans will ensure that the targets envisaged under NTP 2012 are reached.

- **For working capital requirements**: Telecom operators make sizeable investments in franchisee networking, expansion of distribution channels, manpower, marketing, brand promotion, network running costs, power and fuel costs, etc. Return on this investment has as long a gestation period as that of return on capex or spectrum investment. Since funding this working capital requirement through high-cost rupee loans increases input costs further, funding through ECB will help the industry reduce its input costs.

- **For prepayment of debt and working capital finance**: Recently, certain sectors in the infrastructure industry, such as roads and airlines, were permitted to use ECB to prepay their rupee-denominated debt and working capital loans. Similar benefits should be provided to the telecom and tower sector.

2.3.1.6 Entry of OTT services providers

The telecom value chain is undergoing a transition. Another layer of service providers are now a part of the value chain and are providing standalone application services to end users through the telecom network. These applications are being delivered in an over-the-top (OTT) model.

Deemed as OTT content providers, these players facilitate online delivery of content and applications without the telecom operator being involved in controlling or distributing the content.
and applications. The services are delivered directly by the OTT provider to the end-user, independent of the latter’s telecom operator and without the need for carriage negotiations agreement with the operator.

With the entry of new players in the telecom ecosystem and the advent of new service delivery models, there is the need to understand the effect of these changes on legacy networks and benefits of users.

2.3.2 Spectrum-related issues

Spectrum is a scarce and critical resource and its efficient allocation and usage is critical for successful delivery of telecom services in the country. However, several spectrum-related issues such as high pricing, unavailability of optimum quantum of spectrum and lack of a spectrum roadmap are factors that continue to affect the sector adversely.

Figure 22: Spectrum-related factors crucial for service delivery

Source: GSMA, EY analysis

2.3.2.1 High price of spectrum

Spectrum-related policies, especially those pertaining to its optimum pricing, are critical for the growth of telecom services. Alignment of spectrum prices with international benchmarks, keeping in mind local market conditions such as tariff levels, ARPU and purchasing power is important for optimally defining the spectrum pricing.

However, in India, pricing of spectrum has continued to be a critical issue, especially after the country moved to an auction-based pricing mechanism for allocation of spectrum. A high reserve price has been one of the key issues in disbursement of spectrum.

Key recommendations

- There is a need for the Government to support a collaborative environment where all stakeholders will understand the impact of new services such as OTT services on traditional telecom networks, and how these services can benefit users.
Short-term goals of maximizing revenue by governments seeking to reduce budget deficits are actually harmful to the development of the mobile sector and the socio-economic benefits it brings. Public discourse related to maximizing public good from spectrum should therefore not be focused on how much money can be generated for public funds. Instead, it should be focused on how to maximize the overall economic and social returns from spectrum.

Furthermore, excessive bidding for a critical resource in the absence of a clear roadmap for future allocations has led to high spectrum payouts. This has burdened operators’ balance sheets. Lack of clarity on the future course and timelines for distribution of spectrum, results in artificial scarcity, which leads to operators bidding excessively. This was noticed in the 3G and BWA auctions in 2010 where operators bid aggressively in order to safeguard their future service launches of next generation services. 3G payouts (INR677.1 billion) were almost 20 times the reserve price (INR35 billion) set for the auctions. A similar bidding pattern was also witnessed in the recently concluded auctions (March 2015) where the 900MHz clearing price in nine circles was more than twice that of the reserve price.

**Figure 23: Spectrum auction timeline**

**Auctions: 2100MHz**
Pan-India reserve price (per MHz): INR7 billion
Auction highlights: Scarcity-driven participation; strong bidding to ensure 3G footprint
Auction result: 100% spectrum sold; high resultant debt on operators’ balance sheets

**Auctions: 800MHz, 1800MHz**
Pan-India reserve price (per MHz): 800MHz - INR36.4b, 1800MHz - INR28 billion
Auction highlights: High reserve price; limited participation driven by need to ensure business continuity
Auction result: Unsuccessful outcome with no bids in 800MHz and only 47.2% spectrum sold in 1800MHz

**Auctions: 800MHz, 900MHz, 1800MHz**
Pan-India reserve price (per MHz): 800MHz - INR18.2b, 900MHz* - (Delhi (INR7.8 billion), Mumbai (INR7.6 billion), Kolkata (INR1.8 billion)), 1800MHz - INR23.6 billion
Auction highlights: Participation from just one operator (despite cut in reserve price); no bidding in 900MHz and 1800MHz bands
Auction result: Second successive failed auction: 800MHz - 31.6%, 900MHz - No bids, 1800MHz - No bids

**Auctions: 900MHz, 1800MHz**
Pan India reserve price (per MHz): 900MHz* - (Delhi (INR3.6 billion), Mumbai (INR3.3 billion), Kolkata (INR1.3 billion)), 1800MHz - INR17.6 billion
Auction highlights: Rationalization of prices; strong bidding in Delhi, Mumbai and Kolkata; focus on future proofing investments
Auction result: Bulk of spectrum sold – 100% in 900MHz and 79.8% in 1800MHz

**Auctions: 800MHz, 900MHz, 1800MHz and 2100MHz**
Pan India reserve price (per MHz): 800MHz (20 circles) - INR34.2 billion, 900MHz (17 circles) - INR34 billion, 1800MHz (15 circles) - INR14.3 billion, 2100MHz (17 circles) - INR35.1 billion
Auction highlights: Operator focus on safeguarding business continuity resulting in excessive bidding in 900MHz band; muted participation in 2100MHz; bidding in 800MHz led by superior LTE ecosystem in the band
Auction result: Bulk of spectrum sold – 83.1% in 800MHz, 94.5% in 900MHz, 94.6% in 1800MHz, 82.3% in 2100MHz

Source: EY analysis, DoT
*Spectrum was up for auction in three circles only

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Department of Telecommunications
Reasonable spectrum reserve prices should be set that take into account the broader benefits accruing to society and the country due to expanding mobile services at affordable rates.

2.3.2.2 Availability of spectrum

Availability of spectrum continues to be low in India and poses a challenge for most operators. The current quantum of spectrum is insufficient to meet broadband penetration goals envisaged by NTP 2012 and to ensure affordability. India is a spectrum-crunch nation and lags behind its global peers in terms of its distribution of spectrum.

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**Key recommendations**

- Reasonable spectrum reserve prices should be set that take into account the broader benefits accruing to society and the country due to expanding mobile services at affordable rates.

**Figure 24: International comparison — quantum of spectrum distributed within bands (MHz)**

<table>
<thead>
<tr>
<th>Country</th>
<th>800MHz</th>
<th>900MHz</th>
<th>1800MHz</th>
<th>2100MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>2 x 45MHz</td>
<td>2 x 60MHz</td>
<td>2 x 60MHz, 20MHz unpaired</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>2 x 30MHz</td>
<td>2 x 34.8MHz</td>
<td>2 x 70.2MHz</td>
<td>2 x 59.4MHz, 34.2MHz unpaired</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2 x 35MHz&quot;</td>
<td>2 x 75MHz</td>
<td>2 x 60MHz, 20MHz unpaired</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>2 x 30MHz&quot;</td>
<td>2 x 75MHz</td>
<td>2 x 59.4MHz, 15.1MHz unpaired</td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>2 x 30MHz</td>
<td>2 x 34.8MHz</td>
<td>2 x 71.6MHz</td>
<td>2 x 60MHz, 20MHz unpaired</td>
</tr>
<tr>
<td>India*</td>
<td>2 x 12.5MHz</td>
<td>2 x 22.2MHz</td>
<td>2 x 40MHz</td>
<td>2 x 20MHz</td>
</tr>
</tbody>
</table>

* The spectrum holding for Delhi circle have been considered as on 31st January 2015
"E-GSM has been deployed
Source: Wireless Planning Commission, EY analysis

**Figure 25: Global average of spectrum (in MHz) per operator**

- It is essential for the Government to allocate additional spectrum. The unutilized spectrum lying with defence services, the police, broadcasting and ISRO should be re-farmed and considered for allocation to telecom services. Moreover, the Government should make available the entire unsold spectrum.

- Furthermore, licensing authorities should develop a clear roadmap that identifies the frequency bands that will be made available and the proposed timing of these. It is important that spectrum allocation-related decisions are made part of a long-term plan because once spectrum has been allocated, it can be difficult to re-assign. A clear roadmap for the auctions will help operators plan their acquisition strategies better. Lack of clarity on future availability of spectrum and the timelines of auctions lead to artificial scarcity in the market.

Source: TRAI
Mechanisms need to be put in place to ensure efficient utilization of allocated spectrum. In the event spectrum is unutilized, provisions need to be made to safeguard the valuable resource.

**Global initiatives for safeguarding efficient utilization of spectrum**

- In Bangladesh, some of the available spectrum that could have been used for GSM was left idle because it had been allocated to wireless local loop operators that had not established their businesses. This was despite limited spectrum being available for mobile operators.
- Bangladesh’s regulator has subsequently cancelled some of the wireless local loop operators’ licences.

**Key recommendations**

- A clear road-map of availability of spectrum should be provided in the future.
- All spectrum currently lying unutilized with various government agencies should be made available on priority in conformity with globally harmonized bands.

### 2.3.2.3 Backhaul spectrum

Backhaul links and systems are as essential as access links for mobile services. With anticipated data growth in the country, a large number of channels/RF carriers will be needed along with increased RF carrier bandwidths. It is imperative that high frequency bands – of up to 100GHz – are allowed for backhaul network usage. It is also imperative to adopt global best practices for utilization of these bands – light licensing and nominal or token spectrum charges.

**Figure 26: Allocation of spectrum for backhaul networks**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Service area</th>
<th>13/15/18/21 GHz Bands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total number of carriers available</td>
</tr>
<tr>
<td>1</td>
<td>Delhi</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td>Mumbai</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>Kolkata</td>
<td>95</td>
</tr>
<tr>
<td>4</td>
<td>Maharashtra</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>Gujarat</td>
<td>95</td>
</tr>
<tr>
<td>6</td>
<td>A.P.</td>
<td>95</td>
</tr>
<tr>
<td>7</td>
<td>Karnataka</td>
<td>95</td>
</tr>
<tr>
<td>8</td>
<td>Tamil Nadu</td>
<td>95</td>
</tr>
<tr>
<td>9</td>
<td>Kerala</td>
<td>95</td>
</tr>
<tr>
<td>10</td>
<td>Punjab</td>
<td>95</td>
</tr>
<tr>
<td>11</td>
<td>Haryana</td>
<td>95</td>
</tr>
<tr>
<td>12</td>
<td>UP (West)</td>
<td>95</td>
</tr>
<tr>
<td>13</td>
<td>UP (East)</td>
<td>95</td>
</tr>
<tr>
<td>14</td>
<td>Rajasthan</td>
<td>95</td>
</tr>
<tr>
<td>15</td>
<td>Madhya Pradesh</td>
<td>95</td>
</tr>
<tr>
<td>16</td>
<td>West Bengal</td>
<td>95</td>
</tr>
<tr>
<td>17</td>
<td>Himachal Pradesh</td>
<td>95</td>
</tr>
<tr>
<td>18</td>
<td>Bihar</td>
<td>95</td>
</tr>
<tr>
<td>19</td>
<td>Orissa</td>
<td>95</td>
</tr>
<tr>
<td>20</td>
<td>Assam</td>
<td>95</td>
</tr>
<tr>
<td>21</td>
<td>North East</td>
<td>95</td>
</tr>
<tr>
<td>22</td>
<td>J&amp;K</td>
<td>95</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>2090</strong></td>
</tr>
</tbody>
</table>

Source: TRAI
2.3.2.4 Spectrum trading and sharing

Spectrum trading and sharing is likely to provide a viable route for efficient utilization of spectrum that remains unutilized or underutilized with an operator. Spectrum trading and sharing promotes efficient spectrum usage by enabling it to be acquired by operators that can generate the maximum value from its use.

At the same time, the ability to share or trade spectrum provides an incentive for licensees that have unused or underutilized spectrum in order to generate revenue by offering it to others that can make better use of it. Trading and sharing can also help in overcoming inefficiencies during the initial allocation and help operators obtain contiguous bands.

Furthermore, allocation of large blocks reduces the challenge of implementing multiple spectrum bands, especially in users’ equipment, since contiguous spectrum assignments are preferred to reduce the complexity of RF front-end designs. Wide spectrum blocks permit network operators to deliver high-speed services to users in a single band, and also simplify roaming for users with operators within the same band. Therefore, contiguity is likely to enable significantly improved throughput and provide a consistent quality of experience for end users. It will also facilitate efficient and cost-effective rollout of new networks and device-related technologies.

2.3.2.5 Lack of contiguous spectrum bands

The spectrum allocation in India is highly fragmented due to a large number of operators in the market and lack of sufficient spectrum. This has led to unavailability of contiguous spectrum. Fragmentation of spectrum leads to its inefficient usage. Small holdings are a challenge when guard bands are needed to avoid interference at boundaries between frequency blocks for different applications (e.g., between broadcasting and mobile services and between different countries).

Assignment of continuous blocks of spectrum leads to increased efficiency. Contiguous blocks of spectrum can easily accommodate the varying throughput or bandwidths of user traffic. A widened channel can also absorb large and small user data transfers efficiently.

Key recommendations

- Additional spectrum in increased bands should be available for the backhaul network, with a light licensing approach and nominal charges.

- Spectrum trading and sharing should be allowed at the earliest to encourage its efficient use.

- Contiguous spectrum should be allocated for efficient provision of services.
Case study: Importance of contiguous spectrum for high-speed data services

As the demand for data services increases, deployment of LTE is expected to be critical in fulfilling the need for anytime, anywhere access to broadband. LTE will significantly increase data capacity and effectively augment existing 3G networks. It functions best with wide blocks of spectrum. This makes the need for contiguous spectrum imperative.

Wide channels provide optimum mobile broadband performance

- LTE uses an Orthogonal Frequency Division Multiple Access (OFDMA) radio interface that requires large and contiguous blocks of spectrum to operate efficiently.
- OFDMA technology leverages wider bandwidths to enable high data rates and thereby provide an excellent user experience. A bandwidth of 10MHz or more is best suited for deployment of LTE services.
- A wide channel allows licensees to take full advantage of future enhancements to LTE, while increasing their spectral efficiency.

Cost of deployment under different spectrum allocations

- The cost of deploying LTE services increases with the declining block size of contiguous spectrum. For instance, LTE networks in 2x10MHz spectrum channels cost twice as much to deploy as services in 2x20MHz channels.